VIETNAM NATIONAL UNIVERSITY, HO CHI MINH CITY
UNIVERSITY OF TECHNOLOGY
FACULTY OF COMPUTER SCIENCE AND ENGINEERING

DATABASE SYSTEMS LABS (CO2014)

Assignment 1

EERD model and Mapping

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1 Member list & Workload

No.	Fullname	Student ID	Problems	Workload
1	Trần Quốc Hoàn	1952051	- EER Diagram - Mapping - Constraints	25%
2	Trần Quốc Việt	1953097	- EER Diagram - Mapping - Report	25%
3	Trần Anh Dũng	1852306	- EER Diagram - Mapping - Constraints	25%
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2 Introduction

In this assignment, we are going to implement below tasks :

- Design an Enhanced Entity Relationship Diagram (EERD) for Fabric Agency Database and show its appropriate entities, relationships, cardinality ratios.
- Map the above EERD to a relational database schema.
- Identify the constraints that are not shown in the EERD.

3 Enhanced Entity-Relationship Diagram

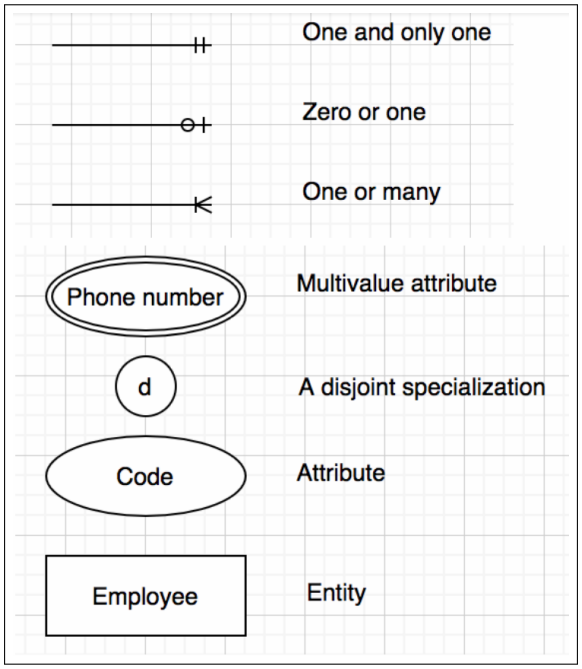
Below is the description of Enhanced Entity-Relationship Diagram :

- "Employee" entity consists of 4 different jobs : Partner staff, Operational staff, Manager, and Office staff. They have 5 different attributes including Code (as a primary key), Gender, Address, Phone Number and Name (consists of First name attribute and Last name attribute).
- One bolt has a unique code, length, and is only categorized into one category only. However, we still use 1:N relationship because many different bolts may belong to one category. Each category has a unique code, name, quantity, color, and has many current prices (the pricing date and actual price are listed correspondingly).
- One order contains one or many bolts. Each order has a unique code, its status, total purchase price, and will be processed by one operational staff. While processing, its date and time will be marked on the system and one operational staff can process one or more orders.
- One customer can make one or many order, but one order can be made by only one customer. Moreover, that customer is allowed to cancel the order if necessary, and the reason must be specified.
- One office staff is responsible for one or more customers, mainly on their arrearage, and may put warning mode or bad debt if customer's debt/arrearage has crossed the limit.

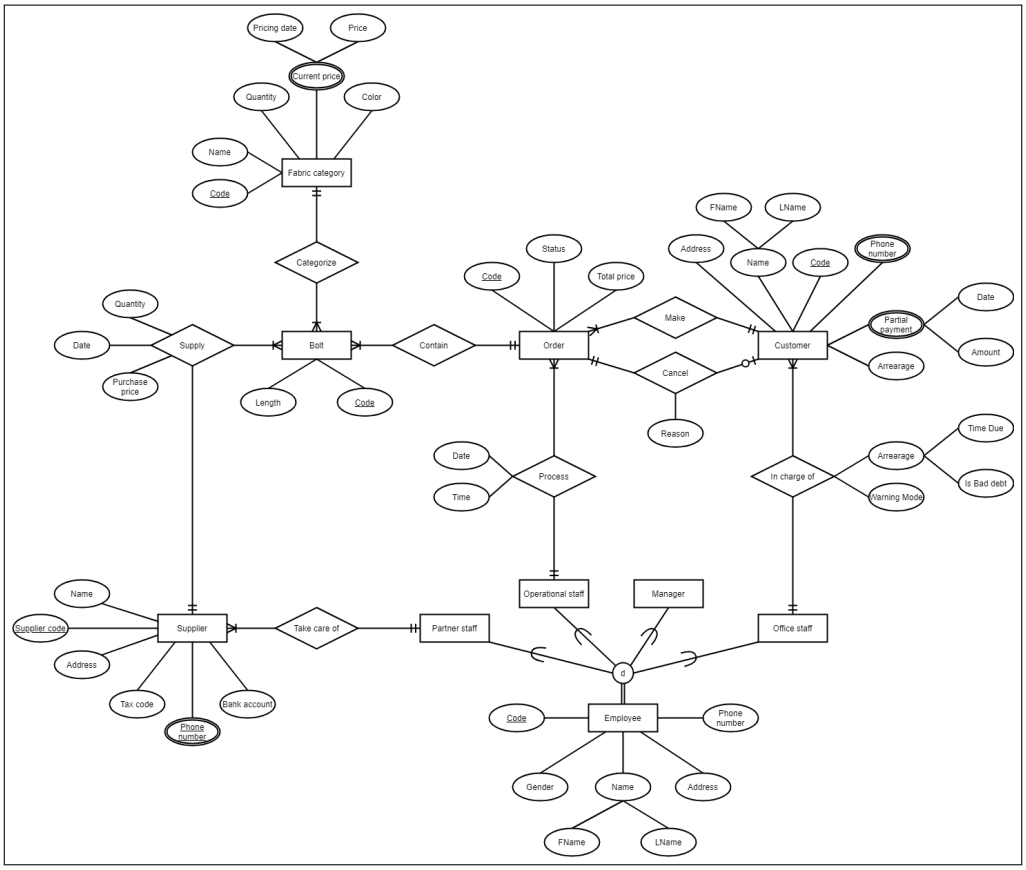
- For the "Supplier" entity, there are 6 different attributes, including Supplier code (as a primary key), Name, Address, Tax code, Bank account, Phone number (which is a multi-value attributes, but also a primary key value).
- One partner staff will take care of one or more suppliers, therefore we use a relationship "take care of" with "One and only one" and "One or many" cardinality.
- The agency takes fabric sources from many suppliers. Each supplier provides many different categories of fabric for the company. However, each category is stemmed from only one supplier. As a matter of fact, "Supply" relationship will be placed between "Supplier" and "Bolt", with cardinality “One and only one” and “One or many”.
- Whenever fabrics are imported into the warehouse, the quantity of each category, the date, and the purchase price must be stored in the database, so the “Supply" relationship has 3 different attributes which are “Date”, “Purchase price” and “Quantity”.

For cardinality of the enhanced entity-relationship diagram :

- Cardinality refers to the maximum number of times an instance in one entity can relate to instances of another entity. Ordinality, on the other hand, it is the minimum number of times an instance in one entity can be associated with an instance in the related entity. Cardinality and ordinality are shown by the styling of a line and its endpoint, according to the chosen notation style.
- In the work, we use the cardinality symbols below :



Below is the drawing of **Enhanced Entity-Relationship Diagram**:

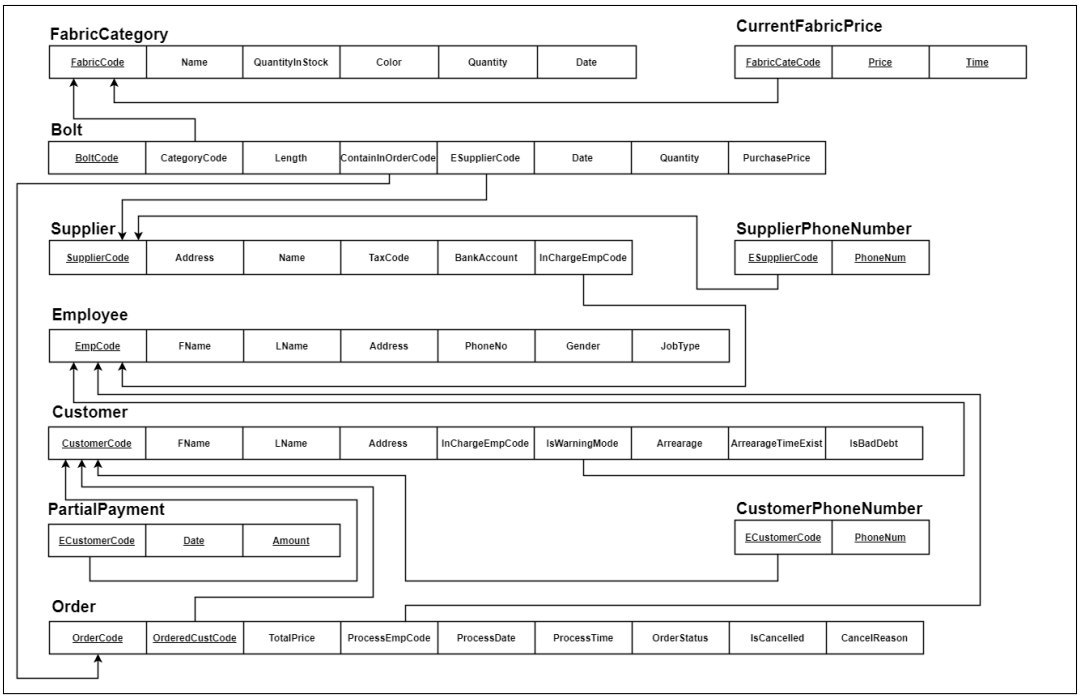


4 Mapping EERD to Relational Databases Schema

For the mapping to relation databases schema, here is our brief description :

- Relation "FabricCategory" has a unique "FabricCode" attribute, it will keep track of name, quantity in stock, date, quantity, and color of the specific category.
- Relation "CurrentFabricPrice" keeps track of the current price for each category as a fabric category has many current price at many time points.
- Relation "Bolt" has a unique code, with its length, supplier info, quantity, price and is linked to a category through "CategoryCode".
- Relation "Supplier" has a unique "SupplierCode", name, address, bank account of a supplier, and tax code.
- Relation "Employee" has a unique code, first name, last name, address, phone number, gender and the type of their job (Manager, Partner staff, Operational staff, and Office staff).
- Relation "Customer" has a unique code, first name, last name, address, the code of the employee who is currently in charge of, a flag indicates the "warning" mode by the system to alert the agency, the current arrearage and the time it has exist until now, and a flag to see if he/she is in a bad debt (has been in warning mode for more than 6 months).
- Relation "PartialPayment" records the date and time when a customer makes a partial payment along with his/her unique code.
- Relation "SupplierPhoneNumber" and relation "CustomerPhoneNumber" records phone number(s) of a supplier and phone number(s) of a customer, respectively.
- Relation "Order" has its unique code, 2 foreign keys are the code of the customer who owns this order and the code of the Employee who processes this order, a total price of the order, process date and time, status of the order (including: "new", "ordered", "partial paid", "full paid" and "cancelled"), a flag to indicate if the order has been cancelled, and the reason for the cancellation (show NULL value if there is no cancellation).

Below is the drawing of EERD Mapping to Relational databases schema:



5 Constraints Identification

Here are some constraints that we additionally identified due to the limit of (Enhanced) Entity-Relationship Diagram. That is, they appeared in the specification of the problem, but it is not possible to display them all on the diagram.

- A bolt's specific category such as : silk, khaki, crewel, jacquard, faux silk, and damask might not be displayed properly. A category code will be the primary key to determine instead.
- Order status can't be determined from the EER Diagram, including "new", "ordered", "partial paid", "full paid". However, "IsCancelled" status with a Boolean data type (It is easier to get from the relation schema), along with its reason can be displayed, and only be in use if the "IsCancelled" value is TRUE. This situation only occurs when the customer cancel the order.
- Whenever the customer makes a new partial payment, the value of arrearage decreases. In the other hand, whenever the customer buys a bolt without paying completely the amount, the value of the arrearage will be increased.
- If the value of the "OrderStatus" attribute of the "Order" entity is "Cancelled" or the value "IsCancelled" is TRUE, the value of the "Reason" attribute of the "Cancel" relationship must not be NULL.
- If the "Arrearage" attribute of the "In charge of" relationship is over $2000, the "Warning mode" attribute of that relationship must be changed to TRUE. If "Warning mode" stays TRUE for 6 months, the arrearage is marked as "bad debt".

- "Manager" entity, a subclass of "Employee" superclass, currently has no use or any relationship yet, but still exists in the EER Diagram to fulfill the specification.
- It is not sure which the staff is in charge of tracking the history payment for the customer, so we chose the office staff for our work.